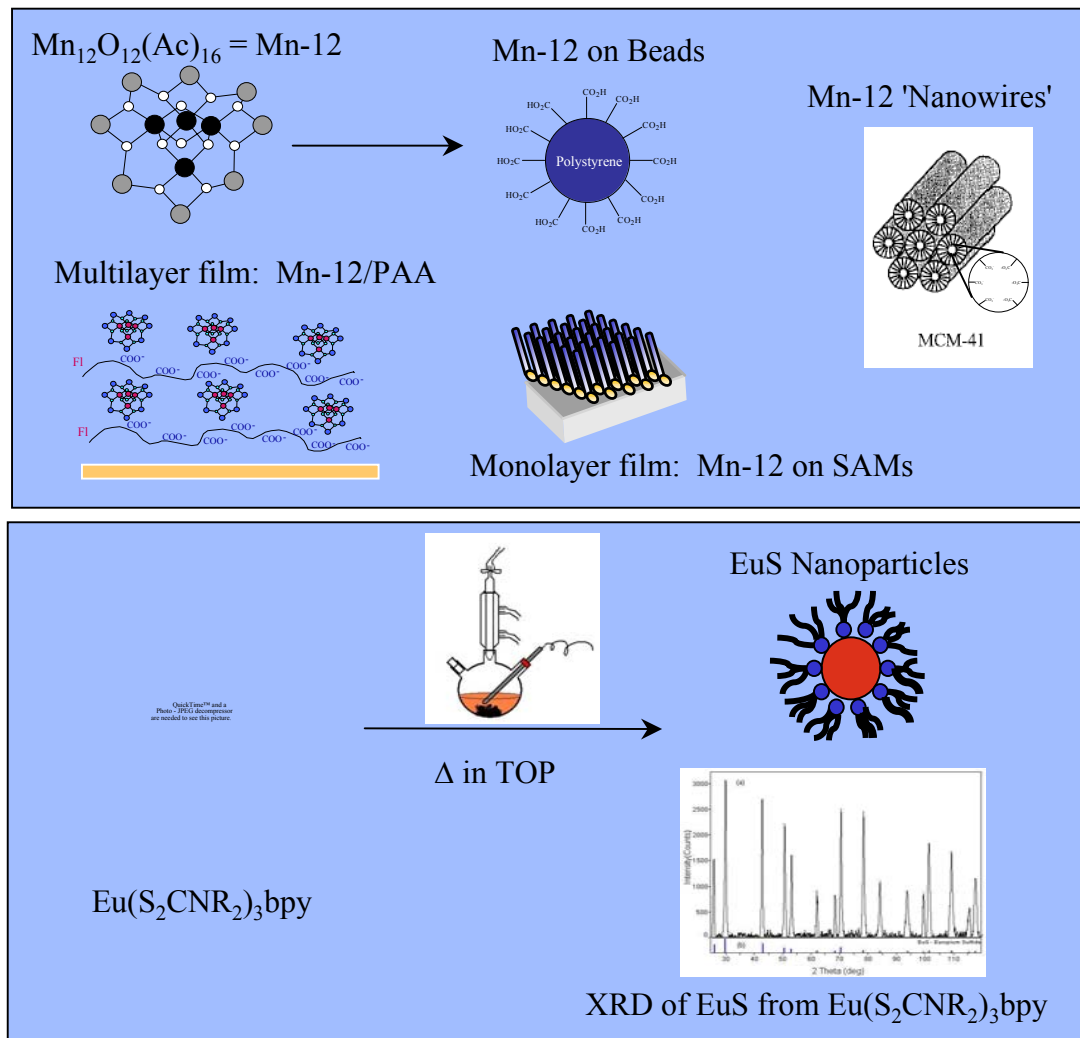


# "NER: Nanostructures from Magnetic Centers and Liquid Crystal Linkers"

*Sarah L. Stoll, Georgetown University* DMR-0304273

We have used a novel magnetic cluster,  $\text{Mn}_{12}\text{O}_{12}(\text{O}_2\text{CCH}_3)_{16}$ , and ligand exchange to create nanostructured materials. We have found that any surface with carboxylate groups can be patterned with the cluster. We have used carboxylate terminated Self Assembled Monolayers and polyelectrolytes to make thin films. We have also inserted the clusters into the tunnels of silane derivatized MCM-41 to form 'nanowires'. Finally, we have used beads covered with carboxylate groups to make high surface area material with surface bound clusters to study the magnetic properties.

We are also developing the synthesis of new magnetic semiconductor nanoparticles from molecular precursors. The magnetic ordering of these materials depend on the band-gap. Using particle size to tune the band-gap we hope to control the magnetic ordering temperature. We have found  $\text{Eu}(\text{S}_2\text{CNR}_2)_3\text{bpy}$  complexes undergo thermolysis in TriOctylPhosphine to form nanoparticles of EuS, a ferromagnetic semiconductor with a  $E_g = 1.65 \text{ eV}$ , and  $T_c = 18.7\text{K}$ .



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\*Four undergraduates, Rachel Pachero, Jessica Cataldi, Louise Wong and Caitlin McMullen contributed to this work.

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Steckel, J. S.; Persky, N. S.; Martinez, C. R.; Barnes, C. L.; Fry, E. L.; Kulkarni, J.; Burgess, J. D.; Pachero, R. B.; Stoll, S. L.; "Monolayers and Multilayers of  $[\text{Mn}_{12}\text{O}_{12}(\text{O}_2\text{CMe})_{16}]$ " *Nano Letters*, **2004**, 4(3), 399-402